10/777140

Refine Search

Search Results -

Terms	Documents
L36 or L37	13

Database:
US Pre-Grant Publication Full-Text Database
US Patents Full-Text Database
US OCR Full-Text Database
EPO Abstracts Database
JPO Abstracts Database
Derwent World Patents Index
IBM Technical Disclosure Bulletins

Search: L38 and koga$

Refine Search

Recall Text

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Interrupt

Search History

DATE: Friday, February 23, 2007 Purge Queries Printable Copy Create Case

Set Name side by side	Query	Hit Count	Set Name result set
DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD; THES=ASSIGNEE; PLUR=YES; OP=OR			
L38	l36 or L37	13	L38
L37	@pd<=20030214 and ((modif$ or edit$) near3 ((gas$ or energy$ or fuel$ or (power$ adj suppl$)) adj3 (curve$ or chart$ or graph$))) and (vehicle$ or car$ or automobile$)	3	L37
L36	@ad<=20030214 and ((modif$ or edit$) near3 ((gas$ or energy$ or fuel$ or (power$ adj suppl$)) adj3 (curve$ or chart$ or graph$))) and (vehicle$ or car$ or automobile$)	12	L36
L35	@ad<=20030214 and ((modif$ or edit$) near3 ((gas$ or energy$ or fuel$ or (power$ adj suppl$)) adj (curve$ or chart$ or graph$))) and (vehicle$ or car$ or automobile$)	0	L35
L34	@ad<=20030214 and ((modif$ or edit$) near3 (fuel$ adj (curve$ or chart$ or graph$))) and (vehicle$ or car$ or automobile$)	0	L34
L33	@ad<=20030214 and (fuel$ with suppl$) and ((modif$ or edit$) near3 (fuel$	0	L33

	adj (curve$ or chart$ or graph$))) and (vehicle$ or car$ or automobile$)		
L32	@ad<=20030214 and (fuel$ with suppl$) and ((chang$ or modif$ or edit$ or correct$) with fuel$ with (curve or chart or graph)) and vehicle	919	L32
L31	@ad<=20030214 and (fuel$ with suppl$) and (fuel$ with (curve or chart or graph)) and vehicle	4061	L31
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L30	(701/50 |701/81).ccls.	1247	L30
L29	((sens$ same load$ same gear$) and (tranmission with rang$))	1	L29
L28	((sens$ same load$ same gear$) same (tranmission with rang$))	0	L28
L27	L21 and ((sens$ same load$ same gear$) same (tranmission with rang$))	0	L27
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L26	L7 and (track$)	0	L26
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L25	L7 and (driv$ same track$)	0	L25
DB=USPT; THES=ASSIGNEE; PLUR=YES; OP=OR			
L24	L7 and (driv$ adj2 track$)	0	L24
DB=PGPB,USPT; THES=ASSIGNEE; PLUR=YES; OP=OR			
L23	L21 and driv$ adj2 track$	7	L23
L22	L21 and "drive-track"	0	L22
L21	(701/50 |701/81).ccls. and L20	186	L21
DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD; THES=ASSIGNEE; PLUR=YES; OP=OR			
L20	engine and ((construc$ adj vehicle$) or earth$)	41074	L20
L19	L2 and ((construc$ adj vehicle$) or earth$)	3	L19
L18	L2 and (construction$ adj vehicle$)	0	L18
DB=USPT; THES=ASSIGNEE; PLUR=YES; OP=OR			
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L16	L15 or L7	3	L16
L15	5121324.pn.	1	L15
DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD; THES=ASSIGNEE; PLUR=YES; OP=OR			
L14	L12 and (fuel$ with suppl$)	8	L14
L13	L12 and (fuel adj2 suppl$)	1	L13
L12	vehicle and (rack adj2 position)	1849	L12
DB=USPT; THES=ASSIGNEE; PLUR=YES; OP=OR			
L11	L5 and (fuel$ with limit$)	1	L11
L10	L7 and (control$ with fuel$ with curve)	1	L10
L9	L7 and (modif$ with curve)	1	L9
L8	L7 and (modif$ with fuel$ with curve)	1	L8
L7	L5 or L6	2	L7
L6	5901684.pn.	1	L6
L5	5670830.pn.	1	L5

DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD; THES=ASSIGNEE; PLUR=YES; OP=OR

L4	L3 and (fuel$ with limit$)	13	L4
L3	L2 and vehicle	21	L3
L2	modif$ with fuel$ with curve	73	L2
L1	modif$ with fuel$ with curve with suppl$	1	L1

END OF SEARCH HISTORY

Hit List

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Search Results - Record(s) 1 through 10 of 13 returned.

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1. Document ID: US 6138782 A

Y

L38: Entry 1 of 13 File: USPT Oct 31, 2000

US-PAT-NO: 6138782
DOCUMENT-IDENTIFIER: US 6138782 A

TITLE: Steering responsive power boost

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

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2. Document ID: US 5901684 A

Y

L38: Entry 2 of 13 File: USPT May 11, 1999

US-PAT-NO: 5901684
DOCUMENT-IDENTIFIER: US 5901684 A

TITLE: Method for processing crankshaft speed fluctuations for control applications

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

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3. Document ID: US 5809969 A

L38: Entry 3 of 13 File: USPT Sep 22, 1998

y

US-PAT-NO: 5809969
DOCUMENT-IDENTIFIER: US 5809969 A

TITLE: Method for processing crankshaft speed fluctuations for control applications

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

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4. Document ID: US 5559697 A

L38: Entry 4 of 13 File: USPT Sep 24, 1996

US-PAT-NO: 5559697
DOCUMENT-IDENTIFIER: US 5559697 A

TITLE: Method for controlling actuation of a vehicle safety device

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

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☐ 5. Document ID: US 5056026 A
L38: Entry 5 of 13 File: USPT Oct 8, 1991

US-PAT-NO: 5056026
DOCUMENT-IDENTIFIER: US 5056026 A

TITLE: User modifiable fuel injection computer

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

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☐ 6. Document ID: US 4428257 A
L38: Entry 6 of 13 File: USPT Jan 31, 1984

US-PAT-NO: 4428257
DOCUMENT-IDENTIFIER: US 4428257 A

TITLE: Motor vehicle control for an infinitely variable transmission

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

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☐ 7. Document ID: US 4408583 A
L38: Entry 7 of 13 File: USPT Oct 11, 1983

US-PAT-NO: 4408583
DOCUMENT-IDENTIFIER: US 4408583 A
**** See image for Certificate of Correction ****

TITLE: Ignition timing control

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

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☐ 8. Document ID: US 4368798 A
L38: Entry 8 of 13 File: USPT Jan 18, 1983

US-PAT-NO: 4368798
DOCUMENT-IDENTIFIER: US 4368798 A

TITLE: Automatic control device of an infinitely variable transmission gear driven by an internal combustion engine, especially for motorized vehicles

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

☐ 9. Document ID: US 4234638 A

L38: Entry 9 of 13 File: USPT Nov 18, 1980

US-PAT-NO: 4234638
DOCUMENT-IDENTIFIER: US 4234638 A

TITLE: Composite graphite sheets

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

☐ 10. Document ID: US 4020859 A

L38: Entry 10 of 13 File: USPT May 3, 1977

US-PAT-NO: 4020859
DOCUMENT-IDENTIFIER: US 4020859 A

TITLE: System for controlling pressure by acoustic means

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

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☐ 11. Document ID: US 3916020 A

L38: Entry 11 of 13 File: USPT Oct 28, 1975

US-PAT-NO: 3916020
DOCUMENT-IDENTIFIER: US 3916020 A

TITLE: System for controlling pressure by acoustic means

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

☐ 12. Document ID: US 3557765 A

L38: Entry 12 of 13 File: USPT Jan 26, 1971

US-PAT-NO: 3557765
DOCUMENT-IDENTIFIER: US 3557765 A

TITLE: FUEL INJECTION PUMP

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

☐ 13. Document ID: US 2839040 A

L38: Entry 13 of 13 File: USOC Jun 17, 1958

US-PAT-NO: 2839040
DOCUMENT-IDENTIFIER: US 2839040 A

TITLE: Fuel injector apparatus for internal combustion engine

DATE-ISSUED: June 17, 1958

INVENTOR-NAME: HIGH CARL F

US-CL-CURRENT: 123/382

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

Clear | Generate Collection | Print | Fwd Refs | Bkwd Refs | Generate OACS

Terms	Documents
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Display Format: - Change Format

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L38: Entry 1 of 13 File: USPT Oct 31, 2000

DOCUMENT-IDENTIFIER: US 6138782 A
TITLE: Steering responsive power boost

Abstract Text (1):
A steering control system for a tracked vehicle includes an engine driven variable displacement steering pump which drives a hydraulic motor. A control system senses steering wheel position, vehicle speed, engine speed and forward/reverse vehicle direction. As a function of these sensed inputs, a control signal is generated and is used to control the swashplate angle of an engine-driven variable displacement pump which drives a steering motor which drives a differential track drive mechanism. The control system also determines a ratio of motor speed to vehicle speed and generates a powerboost signal when the ratio exceeds a threshold value. The powerboost signal is communicated to the engine controller which causes the engine to increase its power output. This modifies the engine fuel delivery curve based on the steering system power requirement and increases the power available for turning the vehicle.

Application Filing Date (1):
19990225

Brief Summary Text (2):
The invention relates to a control system for a tracked vehicle.

Brief Summary Text (3):
Tracked vehicles are steered by driving one track faster or slower than the other and significant power is required for such vehicles to turn. U.S. Pat. No. 4,699,021 issued Oct. 13, 1987 to Waddington, describes an integrated power system for a tracked vehicle driven by a gas turbine, wherein fuel flow to the gas turbine engine is increased when a directional control is placed in a pivot steering or counter-rotation position. However, This system does not increase engine power during normal turning operation (non-counter-rotation steering). But, when a tracked vehicle turns under heavy load, the steering system uses up most of the engine power. For example, if a tracked vehicle is pulling an implement, then, unless engine power output is increased, during a turn there will be less power available to operate the implement. Under such a condition, the operator has to compromise with respect to either vehicle speed or implement depth while turning. Adjusting the implement so that adequate power remains for turning would result in wasted unused power during more prevalent straight ahead operation. Failing to provide adequate power for turning may result in lifting the implement during turns, changing the gear ratio or overloading the engine.

Brief Summary Text (5):
Accordingly, an object of this invention is to provide a tracked vehicle control system which increases engine power output during turning operation relative to the engine power during straight ahead operation.

Brief Summary Text (6):
This and other objects are achieved by the present invention, wherein a tracked vehicle includes an engine controlled by an electronic engine controller. A control system senses steering wheel position, vehicle speed, engine speed and

forward/reverse vehicle direction. As a function of these sensed inputs, a control signal is generated and is used to control the swashplate angle of an engine-driven variable displacement pump which drives a steering motor which drives a differential track drive mechanism. According to the present invention, the control system also determines a ratio of motor speed to vehicle speed and generates a powerboost signal when the ratio exceeds a threshold value. The powerboost signal is communicated to the engine controller which causes the engine to increase its power output. This modifies the engine fuel delivery curve based on the steering system power requirement. This allows increased power to be automatically available for turning the vehicle, thus increasing productivity and reducing the number of required additional operating controls while turning.

Drawing Description Text (2):
FIG. 1 is a simplified schematic diagram of a tracked vehicle drive and the control system of the present invention; and

Detailed Description Text (2):
Referring to FIG. 1, an engine 10 of a tracked vehicle has an output shaft 12 which drives a right angle gear 14 and a transmission 16 via a clutch 18. The engine 10 is controlled by an electronic engine control unit 11. The transmission 16 drives a final or right angle drive 20, which drives a left track drive wheel 22 via left steering planetary drive 24, and a right track drive wheel 26 via right steering planetary drive 28. The steering planetary drives 24 and 28 are preferably such as described in U.S. Pat. No. 5,390,751, issued Feb. 21, 1995 to Puetz et al., and assigned to the assignee of this application. Additional outboard planetaries (not shown), as provided on John Deere 8000 tractors, are mounted between the steering planetaries and the respective drive wheels, but are not further described because they are not directly involved in the steering responsive power boost function which is the subject matter of this application. A parking brake 30 is coupled to shaft 18, and left and right service brakes 32, 34 are coupled to the left and right drive wheels 22, 26, respectively.

Detailed Description Text (8):
A drive line rotation speed sensor 76, preferably a differential Hall-effect speed sensor such as used on production John Deere tractors, is mounted in proximity to the final drive 20, and provides to the SSU 70 a final drive speed, wheel or vehicle speed signal. A magnetic ring 78 is mounted for rotation with the motor 42, and a Hall-effect transducer 80 mounted near the magnetic ring 78 provides to the SSU 70 a motor speed signal and a motor direction signal.

Detailed Description Text (9):
The SSU 70 includes a commercially available microprocessor (not shown) which executes a power boost algorithm 100 which is illustrated by FIG. 2. The power boost algorithm 100 begins at step 102. Step 104 checks sensor 76 to determine if the vehicle speed is near zero or less than a small threshold speed, such as 2 kilometers per hour (kph). If it is, step 108 sets a speed ratio value to zero and directs the algorithm to step 110. If in step 104 the vehicle speed is not near zero, the algorithm proceeds to step 106. Step 106 calculates a speed ratio value equal to a constant (100) times the steering motor speed (from sensor 80) divided by the vehicle speed.

Detailed Description Text (11):
Step 118 then sends to the engine control unit 11 the appropriate boost ON or boost OFF signal as set in step 114 or 116 so that the engine control unit 11 will increase or not increase the power output of the engine 10 accordingly, and then returns control to step 104. Thus, the algorithm 100 operates to increase the power output of the engine 10 when the vehicle is in a turn and when the ratio of steering motor speed to vehicle speed exceeds a certain threshold level. If this threshold level is exceeded, this increased engine power output will be maintained until the ratio drops below a second lower threshold.

Detailed Description Text (12):
If the vehicle is in a purely counter-rotation or pivot steering mode, then the vehicle speed (sensed by sensor 76) will be near zero or less than a small threshold speed, such as 2 kph, and steps 104, 108, 110, 112 and 114 will operate to generate a power boost OFF signal and there will be no engine power boost due solely to this algorithm. It should be understood that the engine controller 11 will perform its normal function and provide sufficient fuel to the engine 10 so that the engine 10 can provide the power necessary for the counter-rotation of the drive wheels 22 and 26. However, the present invention will operate so that, during pure counter-rotation turning, there will be no extra engine power boost beyond that which is normally provided by the engine controller 11.

CLAIMS:

1. A control system for a tracked vehicle having left and right tracks, an engine controlled by an electronic engine controller, the engine driving a differential track drive mechanism which turns the vehicle by driving the left and right tracks at different speeds, the control system comprising:

means for generating a powerboost ON signal when the vehicle is turning in a noncounter-rotational mode;

means for generating a powerboost OFF signal when the vehicle is not turning;

means for communicating the powerboost ON and powerboost OFF signals to the electronic engine controller, the engine controller increasing a power output of the engine above a normal power level in response to the powerboost ON signal, and the engine controller decreasing a power output of the engine back to its normal level in response to the powerboost OFF signal.

2. The control system of claim 1, wherein:

the engine of the tracked vehicle drives a variable displacement pump which drives a steering motor which drives the differential track drive mechanism, and the control system comprises:

a motor speed sensor for generating a motor speed signal representing a speed of the steering motor;

a vehicle speed sensor for generating a vehicle speed signal;

means for calculating a speed ratio representing a ratio of motor speed to vehicle speed;

means for comparing the speed ratio to a threshold value; and

means for generating the powerboost ON signal if the speed ratio is greater than the threshold value.

5. The control system of claim 2, comprising:

means for generating the powerboost OFF signal if the vehicle speed signal is near zero.

6. A control system for a tracked vehicle having left and right tracks, an engine controlled by an electronic engine controller, the engine driving a variable displacement pump which drives a steering motor which drives a differential track drive mechanism which turns the vehicle by driving the left and right tracks at different speeds, the control system comprising:

a motor speed sensor for generating a motor speed signal representing a speed of the steering motor;

a vehicle speed sensor for generating a vehicle speed signal;

means for calculating a speed ratio representing a ratio of motor speed to vehicle speed;

means for comparing the speed ratio to a first threshold value;

means for generating a powerboost ON signal if the speed ratio is greater than the threshold value;

means for comparing the speed ratio to a second threshold value if the speed ratio is not greater than the threshold value; and

means for generating a powerboost OFF signal if the speed ratio is less than the second threshold value, the engine controller increasing a power output of the engine in response to the powerboost ON signal, and the engine controller causing the engine to produce a normal power output of the engine in response to the powerboost OFF signal.

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L38: Entry 2 of 13 File: USPT May 11, 1999

DOCUMENT-IDENTIFIER: US 5901684 A
TITLE: Method for processing crankshaft speed fluctuations for control applications

Application Filing Date (1):
19980914

DATE ISSUED (1):
19990511

Brief Summary Text (3):
The present invention relates generally to internal combustion engines in automotive vehicles and, more particularly, to a method of determining combustion stability of the engine and controlling the fuel injection pulsewidth to fuel injectors for the engine, especially following a cold start.

Brief Summary Text (5):
Automotive vehicles commonly employ a port-injected internal combustion engine in which a fuel injector sprays fuel into air in an intake manifold of the engine near an intake valve of a cylinder as air gets pulled into the cylinder during the cylinder's intake stroke. The conventional fuel injector is typically controlled in response to a fuel injection pulsewidth signal in which the pulsewidth determines the amount of fuel injected into the corresponding cylinder of the engine. The fuel injection pulsewidth signal can be implemented to follow a programmed target fuel injection curve. The programmed target fuel injection curve determines the fuel injection pulsewidth and is generally utilized to provide adequate engine performance when feedback engine control is not available.

Brief Summary Text (6):
Many automotive vehicles commonly employ an oxygen (O.sub.2) sensor generally disposed upstream of the exhaust system for sensing the oxygen level in the exhaust gas emitted from the engine. The oxygen sensor can serve to provide a feedback signal to control engine operation and adjust fuel injection to the engine to achieve good engine performance. However, some conventional oxygen sensors are required to warm up to a sufficiently high temperature before an accurate oxygen sensor reading may be obtained. Also, following an engine start, the oxygen sensor and processing devices initially may not have acquired enough information to provide adequate feedback control. Therefore, for a period of time immediately following cold start up of the vehicle engine, the oxygen sensor may not be capable of providing accurate information with which the engine may be controlled to operate to achieve low hydrocarbon emissions. As a consequence, excessive hydrocarbon emissions may be emitted from the vehicle within the immediate period following start up of the engine.

Brief Summary Text (10):
It is therefore one object of the present invention to provide for control of a vehicle engine based on a learned measurement of combustion stability of the engine.

Brief Summary Text (11):
It is another object of the present invention to provide for a learned combustion

stability value which may be employed to control engine operation while maintaining adequate driveability and performance of the vehicle.

Brief Summary Text (15):
According to one embodiment, the learned combustion stability value is advantageously employed so as to modify the fuel injection to an internal combustion engine, especially following a cold engine start so as to reduce hydrocarbon emissions. This is accomplished by modifying a programmed target fuel injection signal pulsewidth as a function of the learned combustion related value so as to reduce the fuel injected into the engine by fuel injectors. By reducing fuel injection as a function of the learned combustion stability value, reduced hydrocarbon emissions can be realized while maintaining good driveability and performance of the vehicle.

Drawing Description Text (3):
FIG. 1 is a schematic diagram of an electronic fuel injection system illustrated in operational relationship with an internal combustion engine and exhaust system of an automotive vehicle;

Drawing Description Text (4):
FIG. 2 is a block diagram further illustrating components of a vehicle used for sensing engine speed from a crankshaft and modifying fuel injection to the engine;

Drawing Description Text (7):
FIG. 5 is a graph illustrating engine fuel injection modification and shows a programmed fuel control curve contrasted with a modified fuel control curve; and

Detailed Description Text (2):
Turning now to FIG. 1, an electronic fuel injection system 10 is illustrated in operational relationship with an internal combustion engine 12 and an exhaust system 14 of an automotive vehicle (not shown). The exhaust system 14 includes an exhaust manifold 16 connected to the engine 12 and a catalyst 18 such as a catalytic converter connected by an upstream conduit 20 to the exhaust manifold 16. The exhaust system 14 also includes a downstream conduit 22 connected to the catalyst 18 and extending downstream to a muffler (not shown). The internal combustion engine 12 is a fuel injected engine and includes an intake manifold 24 connected to the engine 12 and a throttle body 26 connected to the intake manifold 24. The engine 12 also includes an air filter 28 connected by a conduit 29 to the throttle body 26. It should be appreciated that the engine 12 and exhaust system 14 are conventional and known in the art.

Detailed Description Text (4):
Referring to FIG. 2, a block diagram is provided which illustrates the components of the automotive vehicle 25 for measuring engine speed, determining a combustion related value and modifying fuel injection to the engine. A partial cut-away view of engine 12 is shown illustrating one of a multiple of cylinders 42 in the engine 12. As illustrated, a piston 44 is disposed in the cylinder 42 and is operatively connected by a connecting rod 46 to a crankshaft 48. A camshaft 50 is used to open and close at least one valve (not shown) of the cylinder 42 for various strokes of the piston 44. The piston 44 is illustrated in the expansion (power) stroke of a four stroke engine. In such a four stroke engine, the strokes include intake, compression, expansion (power), and exhaust. During the exhaust stroke, exhaust gases flow from the cylinder 42 via at least one valve and through the exhaust system 14. Although the embodiment shown is a four stroke engine, the principles of the present invention can also be applied to other internal combustion engines, such as a two stroke engine. It should be appreciated that a spark plug is present in the preferred embodiment, although it is not illustrated herein.

Detailed Description Text (5):
The automatic vehicle 25 further includes a sensor target 52 operatively connected

to the crankshaft 48. The sensor target 52 has at least one, and preferably a plurality of trip points, which in the preferred embodiment are provided as slots 54, formed by teeth 56. The vehicle 25 also includes a crankshaft sensor 58 for communicating with the sensor target 52 and a camshaft sensor 60 in communication with the camshaft 50. The vehicle 25 further includes the manifold absolute pressure (MAP) sensor 36, throttle position sensor 34, a vehicle speed sensor 62 and an engine temperature sensor 38. The outputs of the sensors 58, 60, 36, 34, 62 and 38 communicate with the engine controller 30.

Detailed Description Text (6):
The engine controller 30 includes a micro-controller 64 with a digital filter 66, memory 68, signal conditioning circuitry 70 and analog-to-digital (A/D) converters 72 to process outputs from the various sensors according to the methodology to be described hereinafter. In the preferred embodiment, the outputs of crankshaft sensor 58, camshaft sensor 60, and vehicle speed sensor 62 communicate with the micro-controller 64 via appropriate signal conditioning circuitry 70 which is particularized to the type of sensor employed. The output of the manifold absolute pressure sensor 36, throttle position sensor 34 and engine coolant temperature sensor 38 communicate with the micro-controller 64 via the A/D converters 72. The engine controller 30 including microcontroller 64 with digital filter 66 is used to determine a learned combustion stability value and modify a fuel injection control signal as will be described in more detail hereinafter. Memory 68 is a generic memory which may include Random Access Memory (RAM), Read Only Memory (ROM) or other appropriate memory. It should also be appreciated that the engine controller 30 also includes various timers, counters and like components.

Detailed Description Text (10):
In order to illustrate operation of the fuel injection modification methodology 100, FIG. 5 illustrates a programmed target fuel injection curve 126 contrasted with a reduced fuel injection curve 128 as provided by the fuel modification multiplier determined as described in connection with FIG. 4. For a period of time following vehicle startup, the fuel modification methodology 100 utilizes the combustion metric value so as to reduce the amount of fuel injected into the individual cylinders of the engine as may be appropriate to reduce hydrocarbon emissions emitted from the vehicle. The time period for modifying the fuel injection preferably lasts long enough until effective feedback control with the oxygen sensor may be realized. The time period may be set for forty seconds, according to one example, however, varying time periods may be necessary depending upon the engine, temperature, fuel combustibility as well as other factors. According to the example shown, it is preferred that the fuel modification methodology 100 be utilized to reduce the amount of fuel injected into the engine. It is also preferred that the modified fuel injection curve 128 does not exceed the programmed target fuel injection curve 126.

Detailed Description Text (11):
Referring to FIG. 6, a methodology 130 is illustrated for both computing a learned combustion-related value and utilizing the combustion-related value to provide fuel modification to fuel injectors of the engine. Methodology 130 begins with block 132 to obtain engine data such as engine speed, manifold absolute pressure and coolant temperature. Methodology 130 proceeds to block 134 to calculate the combustion metric value as was described above in connection with FIG. 3. An average combustion metric value is computed pursuant to block 136. Also, a determined expected combustion metric value is determined from the engine data and calibrations as provided in block 138. The computed average combustion metric value and the determined expected combustion metric value are compared via block 140 to provide a difference output between the two input signals. According to block 142, methodology 100 uses proportional-integral-differential (PID) control to control the combustion quality of the engine by calculating and applying a fuel injector pulsewidth multiplier to the programmed fuel injection signal to reduce the amount of fuel applied to the engine. Fuel reduction is provided, yet maintaining adequate

driveability and performance of the vehicle, with reduced emissions when possible, especially following a cold engine start of the vehicle. Accordingly, the modified fuel injection reduces hydrocarbon emissions while maintaining good driveability of the vehicle when the oxygen sensor and/or feedback control may not be available.

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